Claims:

1. A method of transmitting signals from a transmitter comprising three or more antennas in a wireless telecommunications network, comprising:

space-time block encoding at least one data sequence;

applying to the data sequence a linear transformation dependent upon knowledge of correlation among the antennas to at least partially compensate the transmitted signals for said correlation, wherein the linear transformation depends on the eigenvalues of an antenna correlation matrix and a ratio of symbol energy to noise variance; and

transmitting the encoded and transformed data sequence.

2. The method of claim 1, wherein the linear transformation is applied prior to block encoding the data sequence.

3. The method of claim 1, wherein the linear transformation is applied after block encoding the data sequence.

4. The method of claim 1, wherein the linear transformation further depends on the eigenvectors of the antenna correlation matrix.

5. The method of claim 4, wherein:

the transmitter has M antennas where M is an integer greater than two, the channel correlation matrix has M eigenvalues, denoted $\lambda_{r,1}, \lambda_{r,2}, \ldots, \lambda_{r,M}$,

E_S / σ^2 is a ratio of symbol energy to noise variance;

the method further comprises calculating values of parameters

$$\beta_i = \left[\left(\frac{1}{\lambda_{r,1}^2} - \frac{1}{\lambda_{r,i}^2} \right) + \left(\frac{1}{\lambda_{r,2}^2} - \frac{1}{\lambda_{r,i}^2} \right) + \ldots + \left(\frac{1}{\lambda_{r,M}^2} - \frac{1}{\lambda_{r,i}^2} \right) \right] \Big/ \left(\frac{\mathbf{E_S}}{\boldsymbol{\sigma}^2} \right), i = 1, 2, \ldots, \mathrm{M}, \text{ and}$$

the linear transformation is determined from these values and from the eigenvectors ($\mathbf{w}_1, \mathbf{w}_2, \mathbf{w}_3, \ldots \mathbf{w}_M$) of the antenna correlation matrix.

6. The method of claim 5, wherein:

$$\mathbf{L} = \frac{1}{\sqrt{\mathrm{M}}} [\; \mathbf{w}_1 \quad \mathbf{w}_2 \quad \ldots \quad \mathbf{w}_\mathrm{M} \;] \begin{bmatrix} \sqrt{1+\beta_1} & 0 & 0 & \mathrm{L} & 0 \\ 0 & \sqrt{1+\beta_2} & 0 & \mathrm{L} & 0 \\ 0 & 0 & \mathrm{O} & 0 & \mathrm{M} \\ \mathrm{M} & \mathrm{M} & 0 & \mathrm{O} & 0 \\ 0 & 0 & \mathrm{L} & 0 & \sqrt{1+\beta_\mathrm{M}} \end{bmatrix}$$

7. A transmitter for wireless telecommunications comprising a space time block encoder, and a linear transformation apparatus operative to transform the data sequence from or to a space-time block encoder to at least partially compensate for correlation between antennas, and the transmitter comprising two or more antennas operative to transmit the encoded and transformed data sequence, the linear transformation apparatus comprising:

a first processor operative to determine an antenna correlation matrix (**R**); and

a second processor operative to:

determine the eigenvalues of the antenna correlation matrix;

determine the ratio of symbol energy to noise variance; and,

determine a linear transformation matrix (**L**) to be applied dependent upon the eigenvalues and on a ratio of symbol energy to noise variance.

8. The transmitter of claim 7, wherein the linear transformation further depends on the eigenvectors of the antenna correlation matrix.

9. The transmitter of claim 8, wherein:

the transmitter has M antennas where M is an integer greater than two,

the second processor is operative to determine the M eigenvalues $(\lambda_{r,1}, \lambda_{r,2}, \ldots, \lambda_{r,M})$ of the antenna correlation matrix

and to calculating values of the following parameters

$$\beta_i = \left[\left(\frac{1}{\lambda_{r,1}^2} - \frac{1}{\lambda_{r,i}^2}\right) + \left(\frac{1}{\lambda_{r,2}^2} - \frac{1}{\lambda_{r,i}^2}\right) + \cdots + \left(\frac{1}{\lambda_{r,\mathrm{M}}^2} - \frac{1}{\lambda_{r,i}^2}\right)\right] \Big/ \left(\frac{\mathbf{E}_\mathrm{S}}{\boldsymbol{\sigma}^2}\right), i = 1,2,\ldots,\mathrm{M}$$

wherein $\mathbf{E}_\mathrm{S} / \sigma^2$ is a ratio of symbol energy to noise variance;

the linear transformation being determined from these values and from the eigenvectors of the antenna correlation matrix.

10. A transmitter according to claim 9, wherein the first processor operative to determine the antenna correlation matrix (**R**) makes the determination from channel estimates.

11. A receiver for mobile telecommunications comprising a space-time block decoder and a channel estimator, the antenna correlation matrix (**R**) being determined from the received channel estimates provided by the channel estimator, the space-time block encoder comprising a processor operative to determine a antenna correlation matrix (**R**), and a processor operative to:

determine the eigenvalues of the antenna correlation matrix;

determine the ratio of symbol energy to noise variance; and

determine a linear transformation matrix (**L**) that was applied dependent upon the eigenvalues and on a ratio of symbol energy to noise variance.

12. A space- time block decoder comprising a first processor operative to determine an antenna correlation matrix, and a second processor operative to: determine three or more eigenvalues of the antenna correlation matrix, determine the ratio of symbol energy to noise variance, determine a linear transformation matrix that was applied dependent upon the eigenvalues and on a ratio of symbol energy to noise variance.

13. A space-time block decoder according to claim 12, wherein an effective channel used in decoding is taken to be **HL** where **H** is the channel matrix and **L** is the linear transformation matrix.

14. A linear transformation apparatus operative to transform symbols from or to a space-time block encoder to at least partially compensate for correlation between antennas of a transmitter comprising three or more antennas, comprising: a first processor operative to determine an antenna correlation matrix (**R**), and

a second processor operative to:

determine the eigenvalues of the antenna correlation matrix;

determine the ratio of symbol energy (E_s) to noise variance; and

determine a linear transformation matrix (**L**) to be applied dependent upon the eigenvalues and on the ratio of symbol energy to noise variance.

15. A method of linear transformation of symbols from or to a space-time block encoder to at least partially compensate for correlation between antennas of a transmitter comprising at least three antennas, the method comprising the steps of:

determining an antenna correlation matrix;

determining the eigenvalues of the antenna correlation matrix; and

determining the ratio of symbol energy to noise variance, and determining a linear transformation matrix (L) to be applied dependent upon the eigenvalues and on the ratio of symbol energy to noise variance.